DETAILED ACTION

1. Claims 1-3, 5-16, and 19-21, and 24 are presented for examination.

2. Claim 24 was added as new in amendment filed 10/23/2009.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-2, 5-7, 11-16, 19-21, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanoh et al. (U.S. Patent No. 4,643,576) in view of Devie (U.S. PGPub No. 2003/0112426 A1) further in view of Almogy (U.S. PGPub No. 2003/0058433 A1).**

5. As to claims 1 and 19, Kanoh discloses and shows in figure 1, an apparatus for indicating the departure of a shape of an object from a specified shape, the apparatus comprising:

radiation means (11) for directing an incident beam of radiation onto the object (15) (col. 2, lines 26-34), and

inspecting means (16-18, 21 and 22) for inspecting a final beam, said object (15) located optically between said radiation means and said inspection means (i.e. explicitly shown in figure 1) (col. 3, lines 30-51)

at least one wavefront shaping means, (14) optically disposed between the radiation means and the inspecting means (i.e. where as shown explicitly in figure 1, the

wavefront shaping means 14 is optically in between radiation means 11 and inspecting means (16-18, 21 and 22) for shaping the final beam to have a substantially planar (i.e. where as disclosed the wavefront is a planar wave that deviates due to possible errors in the surface under test 15) the wavefront is planar expect for slight deviations due to wavefront when said object has said specified shape, and said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by said wavefront shaping means, said at least once wavefront shaping means is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting means is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting means comprises (col. 3, lines 21-29; the examiner is now treating the claim with respect to 35 USC 112 6th paragraph language due to the amended inclusion of the root word "for"):

beamsplitting means (16-18) for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations (col. 3, lines 30-51); and

Kanoh does disclose directing two or more beams to laterally displaced locations (i.e. explicitly shown in figure 1, and further implicit in a shearing interferometer such as Kanoh) on a detector (i.e. photodetector 22) (col. 2, lines 65-68).

Kanoh does no explicitly disclose a detector means (i.e. a CCD detector).

However, Devie does disclose and show in Fig. 3 and in ([0052]) a detector means (22) for detecting radiation intensity of said two or more beams on the detector means (where inherently the CCD as disclosed are detecting intensity).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh with a CCD detector in order to provide the advantage of reduced cost through the wide availability and use of CCD detectors.

Kanoh in view of Devie does not explicitly disclose where the beamsplitting means of said inspecting means comprises at least one of a diffraction grating and hologram.

However, Almogy does disclose in ([0078]) the use of a diffraction grating in place of a beamsplitter in order to split a beam of light. Therefore because the two beam splitting devices were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a beamsplitter for a diffraction grating.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with a diffraction grating in order to provide the advantage of added versatility due to an additional optical component which can be used to provide beam splitting capabilities.

The subject matter of claims 1 and 19 relate in that the technical features of apparatus claim 1 are in each case suitable for implement the method of claim 19, therefore the method is obvious in view of the above apparatus rejection.

As to claim 24, Kanoh discloses and shows in figure 1, an apparatus for indicating the departure of a shape of an object from a specified shape, the apparatus comprising:

a radiation source (11) for directing an incident beam of radiation onto the object (15) (col. 2, lines 26-34);

a beam inspecting device (16-18, 21 and 22) for inspecting a final beam, wherein said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by at least one wavefront shaping device, said object located optically between said radiation source and said inspecting device (col. 3, lines 21-51);

said at least one wavefront shaping device (14),optically disposed between the radiation source and the inspecting device, for shaping the final beam to have a substantially planar wavefront when said object has said specified shape, said at least one wavefront shaping device is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting device is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting device comprises (col. 3, lines 21-29):

a photosensor (22) for detecting radiation intensity of said two or more beams at said laterally displaced locations (col. 2, lines 65-68).

Kanoh does disclose a beamsplitting device (16-18) for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations (col. 3, lines 30-51); and

Kanoh in view of Devie does not explicitly disclose where the beamsplitting device is a diffractive device such as a diffraction grating and hologram.

However, Almogy does disclose in ([0078]) the use of a diffraction grating in place of a beamsplitter in order to split a beam of light. Therefore because the two

beam splitting devices were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a beamsplitter for a diffraction grating.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with a diffraction grating in order to provide the advantage of added versatility due to an additional optical component which can be used to provide beam splitting capabilities.

As to claim 2, Kanoh discloses and shows in figure 1, an apparatus wherein said radiation means (11) is arranged to produce a collimated beam (i.e. by collimator lens system 12) of radiation (col. 2, lines 26-34).

As to claim 5, Kanoh discloses and shows in figure 1, an apparatus wherein at least one said wavefront shaping means is located between the radiation means and the object (Fig. 1, explicitly showing wavefront shaping means 14 optically and physically between radiation means 11 and object 15).

As to claim 6, Kanoh discloses and shows in figure 1, an apparatus wherein at least one said wavefront shaping means (14) is located between the object (15) and the inspecting means (16-18, 21 and 22) (Fig. 1, explicitly showing wavefront shaping means 14 optically and physically between object 15 and inspecting means (16-18, 21 and 22)).

As to claim 7, Kanoh discloses and shows in figure 1, an apparatus wherein at least one said wavefront shaping means comprises a lens (14) or curved reflector (col. 2, lines 26-34).

As to claim 11, Kanoh discloses and shows in figure 1, an apparatus comprising a beam splitter (13) between said radiation means (11) and said inspecting means (16-18, 21 and 22) (col. 2, lines 26-34).

As to claim 12, Kanoh in view of Devie does not explicitly disclose where the beamsplitting means of said inspecting means comprises at least one of a diffraction grating and hologram.

However, Almogy does disclose in ([0078]) the use of a diffraction grating in place of a beamsplitter in order to split a beam of light. Therefore because the two beam splitting devices were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a beamsplitter for a diffraction grating.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh in view of Devie with a diffraction grating in order to provide the advantage of added versatility due to an additional optical component which can be used to provide beam splitting capabilities.

As to claim 13, Kanoh discloses and shows in figure 1, an apparatus wherein the beamsplitting means of said inspecting means comprises non-diffractive beamsplitter (16) means for receiving light from two spaced object planes (i.e. one of the multitude of points along curved surface of object 15) along a common path for transmission to first and second image areas along respective first and second optical paths, and focusing means (21) arranged to bring said first and second object planes into focus in said first and second areas (col. 3, lines 30-51).

As to claim 14, Kanoh discloses an apparatus wherein the inspecting means is arranged to provide an analysis of the shape, or components of the shape, of the wavefront of the final beam (col. 3, lines 1-3; col. 5, lines 57-60, further the examiner would like to point out that the above limitation in merely the intended use of the above disclosed inspecting means structure and provides no additional patentable weight via structure to the system).

As to claims 15 and 16, Kanoh does not explicitly disclose an apparatus wherein the detector means of the inspecting means comprises a pixelated imaging photosensor such wherein the pixelated imaging photosensor is a charge coupled device (CCD) array.

However, Devie does disclose and show in figure 1, an apparatus wherein the detector means of the inspecting means comprises a pixelated imaging photosensor (i.e. CCD 18) such wherein the pixelated imaging photosensor is a charge coupled device (CCD) array ([0052]; [0058]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh with a CCD detector in order to provide the advantage of reduced cost through the wide availability and use of CCD detectors.

As to claim 20, Kanoh discloses a method wherein said object (15) is an optical component (col. 2, lines 26-34).

As to claim 21, Kanoh does not explicitly disclose a method wherein said optical component is a window or is of generally laminar form, or comprises a planar reflective

surface (though Kanoh does disclose in figure 1, a curved reflector 15 which could be interpreted as a generally laminar (i.e. though curved has a smooth surface).

However, Devie additionally does disclose and show in Fig. 3, a method wherein said optical component is a window or is of generally laminar form, or comprises a planar reflective surface (where the examiner is interpreting lens 34 as a windows as shown it transmits light).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh with a window in order to provide the advantage of increased versatility through the ability to measure additional optical components types.

6. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanoh in view of Devie in view of Almogy further in view of Kuchel.

As to claim 3, Kanoh in view of Devie further in view of Almogy does not explicitly disclose where wherein said incident beam of radiation is optical radiation.

However, Kuchel does disclose in ([0021]) an apparatus wherein said incident beam of radiation is optical radiation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh in view of Devie further in view of Almogy with using optical wavelength ranges in order to provide the advantage of increased versatility from using the wavelength range that is most commonly used for optical components.

As to claim 10, Kanoh does not explicitly does disclose where the object includes an adjusting means.

However, Devie does disclose and show in figure 2 and in ([0062]) where the object includes an adjusting means (32) to adjust the position of the object under test.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh with an adjusting means in order to provide the advantage on increased versatility by allowing both sides of the object to be measured.

Kanoh in view of Devie further in view of Almogy doe not explicitly disclose an apparatus and including means for adjusting the relative position of the said wavefront shaping means.

However, Kuchel does disclose in ([0015], lines 1-7) where the legs of the interferometer have supports for positioning. One of ordinary skill in the art at the time the invention was made would recognize that in an optical lens system the lenses and object are obviously moveable in order to direct light in specific paths and at specific focus points.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh in view of Devie further in view Almogy by providing a moveable object and wavefront shaping means in order to provide the advantage of a versatile system that can accommodate many optical components through repositioning.

7. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanoh in view of Devie in view of Almogy further in view of Burge et al (U.S. Patent No. 5,737,079).

As to claims 8 and 9, Kanoh in view of Devie further in view of Almogy does not explicitly disclose an apparatus wherein at least one said wavefront shaping means and beamsplitting means comprises a diffraction grating or hologram or is provided by a spatial light modulator.

However, Burge does disclose in (col. 2, lines 17-31) where both spatial filters (i.e. spatial light modulators) and diffraction gratings can be used in order to manipulate wavefronts (i.e. to be used as wavefront shaping means) in order to match a reference wavefront to the shape of an expected wavefront.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kanoh in view of Devie further in view of Almogy with a diffraction grating or spatial light modulator in order to provide the advantage of increased versatility in having multiple ways in which to shape a wavefront to a desired shape before impinging on an object under test.

Response to Arguments

8. Applicant's arguments with respect to claims 1-3, 5-16, and 19-21 have been considered but are moot in view of the new ground(s) of rejection.

Prior Art made of Record

9. The prior art made of record and not relied upon is considered pertinent to applicants disclosure.

a. Ohsaki et al. (U.S. PGPub No. 2002/0176090 A1) discloses a similar wavefront shaping means capable of deforming and providing a planar wavefront to a surface under test.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL LAPAGE whose telephone number is

(571)270-3833. The examiner can normally be reached on Monday Through Friday 7:30AM-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on 571-272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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